EFFECT OF COOPERATIVE LEARNING ON STUDENTS' ACHIEVEMENT AND RETENTION IN ELECTRICAL WORK MAINTENANCE IN GOVERNMENT TECHNICAL COLLEGES.

By

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Abstract

The research was designed to study effect of cooperative learning on achievement and retention of electronic work students in Government Technical Colleges in Niger state. Specifically the study determine the difference in mean achievement scores between the students taught with cooperative learning and those taught with conventional method and determine the difference in mean retention scores between the student taught with cooperative learning and those taught with Conventional method in electrical work maintenance course. 2 research questions and 2 null hypotheses were formulated and tested at 0.05 level of significance to guide the study. 20 objective questions and 2 theories were used to collect data for the study. The study used the quasi-experimental design. Specifically, the pretest-posttest-retention design with experimental and equivalent control group was used. The target for the population consists of 4 teachers in technical colleges and 179 students in TC 2 in Government Technical Colleges in Minna and Bida. Data obtained were analyzed using mean, standard deviation and z-test statistics. The findings of the study showed that the cooperative learning methods as an active learning have affected students' achievement and retention positively. Based on the finding, it was recommended among others that cooperative learning method should be put to use and students are likely going to perform well in internal and external examination.

Introduction

The ultimate aim of education is human refinement. Education should enable the learner to formulate a positive outlook towards life and to accept a stand which suits the well being of the society and the individual as well. The educational process expected in and outside our formal schools should concentrate upon inculcating concepts, abilities, attitudes and values in tune with these work culture. Hence vocationalised education cannot be isolated from the main stream of education. Vocational Technical education (VTE) is system of education which intends to prepare learners for identified occupations, and opening several areas of activities. Uwaifo (2003) advocated that VTE is a multifaceted, multi-disciplinary and pragmatic field of study, is aimed at equipping the individuals with requisite VTE literacy skills, which will enhance their relevance and functionality in the society. As result, it plays a vital and indispensable role in the development of the society. FRN (2004) recognizes VTE as that part of the total educational system which leads to the acquisition of practical and applied skill and scientific knowledge. The national policy of education attaches much emphasize to VTE, for it is the nation's spring board for the acquisition of relevant skills for technological and economic development with regards to the demand for skilled manpower. The research will focus n electrical installation maintenance work as one of the VTE courses

Educating students on electrical installation maintenance work can be achieved through appropriate teaching and learning. The goal of teaching is to improve student learning by maximizing opportunities for learning in every lesson. Such improvement reduces wastage of resources such as time, effort and money by producing students with the right skills and knowledge that delight the employers. The concepts of teaching and learning are most central to education. Kalusi (2005) defined teaching as a way of giving instruction to somebody or causing somebody to know or be able to do something. It is also regarded as a skill for promoting performance in learning. Ogwo and Oranu (2006) and Okoro (2006) defined learning as the process by some activities enable the learner acquire experience that tend to influence (change) his/her future behaviour; provided that the characteristics of the change in behaviour cannot be explained on the basis of negative response tendencies, maturation or temporary states of the learner. To achieve the desired teaching and learning, Teachers have the option of structuring lessons competitively, individualistically, or

cooperatively. The decisions teachers make in structuring lessons can influence students' interactions with others, knowledge, and attitudes (Johnson and Johnson, 1991).

Co-operative learning is the learning which the learners help one another. Those who have moreknowledge, experience and competency, will help others. By this exchange of resourcesthe learners develop a plane of social system in learning. Johnson, Johnson, and Smith, (1999) said that cooperative learning is an instructional approach in which students work in a team on a learning task structured to have the following features: Positive independence; Individual accountability; Face-to-face primitives' interaction; Appropriate use of interpersonal and teamwork skills; Regular self-assessment of team functioning. Cooperative learning is one of the recommended teachings – learning techniques in which students achieve learning goals by helping each other in a social setting. Kagan (1994) recognizes the need for cooperative learning as a global answer to education. He believes that there is a need to incorporate cooperative learning into educational system for three major reasons: Socialization practices, economy, and the demographics of society. Cooperative learning which is also called Team Approach is a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities and a number of activities to achieve academic objectives and improve their understanding of subject matter (Johnson, & Johnson, 1991). Okoro (2006) explained that each member of a team is responsible not only for learning what is taught but also for helping teammates learn, thus creating an atmosphere of achievement. Students work through the assignment until all group members successfully understand and complete it. Cooperative efforts result in participants striving for mutual benefit so that all group members gain from each other's efforts. Students should gain experience sharing responsibility for learning with each other. In the process of coming to common understandings, students in a group must frequently inform each other about procedures and meanings, argue over findings, and assess how the task is progressing. Cooperative learning is a way to facilitate student-student interactions efficiently and systematically. As schools move closer to the goal of providing education for all children within, increasing amounts of attention and energy are being devoted to developing pedagogical approaches that are appropriate in heterogeneous classrooms. Teachers must structure the educational and

social environment so that students develop the knowledge, skills, and attitudes required to interact across both perceived and actual differences and disabilities. Technical college/school provides preparation by training students with skills needed for employment. It is a leading organization that helps people find trade and develop skills. Several courses are offered in Technical Colleges, such as electrical work maintenance, Automobile technology, woodwork, electronics and others but the study focus on electrical work maintenance as a Technical college course. Electrical work maintenance provide the youth with practical skills in work pertaining to electrical circuits, domestic industrial installation, cable jointing and winding of electrical machines. Electrical work maintenance is vast in Nature and has continued to experience changes and improvement from time to time. There is hardly any human activity where electricity has not made impact. Electrical work maintenance according to Theraja and Theraja (2001) is the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of electrical appliances. For electrical work maintenance students should be able to apply what was taught after graduation, if their level of achievement and retention is high. Learning and teaching method is therefore very important.

Achievement is the outcome of level of accomplishment in a specified programme of instruction in a subject area or occupation which a student had undertaken in the recent past. Academic achievement of students is the translation of the students' performance in achievement test into scores obtained in a cognitive test. Lee, & Yeap, (1997) contended that achievement is quantified by measures of students' academic standing in relation to those of other students tested with the same instrument. The low academic achievement of students in electronic work may be as a result of inappropriate usage of instructional methods by the technical teachers and thereby affect student's retention of what is taught (Okoro, 2006).

Retention of learning is defined as the repeat performance of a learner of the behavior earlier acquired after an interval of time (Momoh-Olle (2007). According to Learning Pyramid, retention rates increased with the amount of student involvement. The rates were the highest with teamwork which included (a) discussion groups: 50%, (b) practice by doing: 75%, and (c) teaching others/immediate use of learning: 90%. As a sharp contrast, the retention rate of the traditional ways of individual and passive learning like lecturing (5%), reading (10%),

and demonstration (30%) lasted no more than 30 percent. In contrast, the retention rate of the long existing method of lecturing was as low as only five percent (Krivickas, and Krivickas, 2007). Base on the benefit of electrical work maintenance to the society and also the benefit of cooperative learning, the research intend to investigate on the effect of cooperative learning on achievement and retention of electrical work maintenance student in Government Technical Colleges in Niger State.

Statement of the Problem

In Nigeria There is a growing concern over the decline in students' achievement in electrical work maintenance in Technical Colleges and the students' achievement and retention in electrical work maintenance trades has been the winding in recent time and the situation calls for immediate attention in the technical colleges (Umunadi, 2007, Umunadi, 2009). Inadequate instructional treatment have contributed to this state of poor achievement in both internal and external examinations, and therefore arises for exploring some effective teaching and learning techniques and there is need for urgent intervention in the areas of training teachers as it is the panacea against poor performance of students in both internal and public examinations across the country (Musa, and Ekwukoma, 2013). The poor performance of students in the country can be traced to increasing decline in teacher quality of instruction.

Kalusi (2005) said that, education is a teaching learning process and learning depends upon instruction. During instruction, a child cannot be treated like an empty vessel into which any type of information can be passed down. A teacher must think of ways and means of stimulating and encouraging learning in the students. He should provoke their interest and motivate them to learn. He should create conditions in which they feel the need to learn. Cooperative learning claims to help the students in such a situation. It seems, there is little or no evidence in literature to show the application of cooperative learning style in the teaching of electrical work maintenance. Would the application of cooperative learning style increase the achievement and retention level of students in electrical work maintenance?

Purpose of the Study

The major purpose of this study was to determine the effects of cooperative learning on students' achievement and retention of electrical work maintenance. Specifically, the study determined;

1. Difference in mean achievement scores between the students taught with cooperative learning and those taught with Conventional method in electrical work maintenance.
2. Difference in mean retention scores between the student taught with cooperative learning and those taught with Conventional method in electrical work maintenance.

Research Questions

The following research questions were used to guide this study.

1. What are the mean achievement scores of students taught electrical work maintenance using cooperative learning and students taught using conventional method?
2. What are the mean retention scores of students taught electrical work maintenance using cooperative learning and students taught using conventional method?

Hypotheses

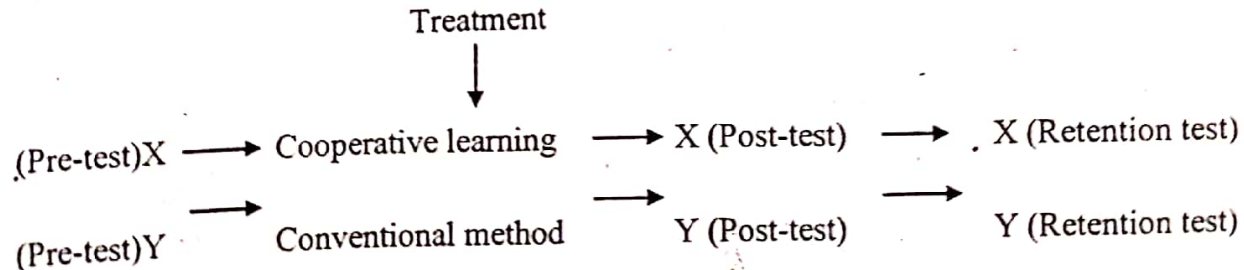
The following null hypotheses were formulated and tested at 0.05 level of significance

HO_1: There is no significance in the mean achievement scores of student taught electrical work maintenance using cooperative learning and students taught with conventional method.

HO_2: There is no significance in the mean retention scores of student taught electrical work maintenance using cooperative learning and students taught with conventional method.

Methodology

The study used the quasi-experimental design. Specifically, the pretest-posttest design with experimental and equivalent control group was used. This implies that non-intact classes', non-randomized groups were used for the study. This design was adopted because it was not possible for the research to randomly sample the subject and design them to group without disrupting the academic programme of the school involved in the study of the design is represented below in the research design



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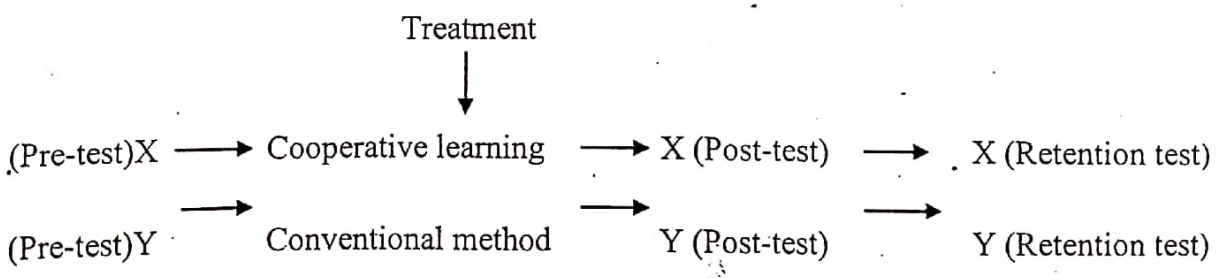

Quasi-experimental design is mostly applied to real life situation in education where random assignment of subject to treatment groups cannot be carried out without extensive disruption of the school programme (Okoro, 2006). The design notation is graphically shown Experimental Group: $O_1 \times O_2, O_3$ Control Group: $O_1 - O_2, O_3$

O_1: represents pre-tests, O_2: represents post-tests; O_3: represents retention tests; X: stands for the treatment using Cooperative Learning Techniques. - : stands for treatment with Conventional Method

The study was conducted at Government Technical College, Minna and Government Technical College Eyagi- Bida. Also the area posses all the necessary facilities like equipped workshop, classroom and personnel needed for carrying out the research. The accessible target population comprised of the students in Technical College Two (TC II) who offers electrical work maintenance in Government Technical College, Minna and Government Technical college Eyagi- Bida, Niger state. The population composed of 96 students in Government Technical College, Minna and 83 students in Government Technical College Eyagi- Bida in 2011/ 2012 academic year. No sample was made since population is not too large to control.

Instrument used for study was cooperative learning approach and the conventional learning approach each has different lesson plans. The cooperative learning of electrical work maintenance constituted the experimental group while the control group was taught by the convention lecturing approach. The multiple-choice pre-test, post-test and retention test consisting of twenty (20) items and short essay test of four (4) questions based on NABTEB modular curriculum syllabus for electrical work maintenance. The researchers developed 16 lesson plans consisting of 8 experimental group lessons plans and 8 control group lessons plans, based on the content area of the study to assess the effectiveness. The pre-test was first conducted before the commencement of treatment these exercise provides baseline data that was used to compare subject in both groups, and the lesson plan incorporate learning style which is cooperative learning.

The experimental group and control group was taught 8 lessons using the prepared lesson plans. Each lesson lasted for 45 minutes and the treatment lasted for eight weeks. At the end of the treatment, a posttest was administered on both group with the electrical work maintenance achievement test and the scores obtained from both groups were compared to determined if there was any significant difference in the performance of the two groups.

The research questions were answered using mean and standard deviation of the best scores while z-test was used to test the hypothesis at 0 .05 level of significance. The choice of z-test becomes necessary since two groups were involved and the pre-test means of both groups were almost equal, that necessitate the use of Z-test. The z-critical value was 1.98 of 177df

Research Question 1

What are the Achievement scores of students taught electrical work maintenance using cooperative learning and students taught using conventional method.

Table 1: Mean Scores of Students in Experimental Group Taught Domestic Industrial Installation using Cooperative learning and Conventional Group.

GROUP	N	PRE - TEST	POST-TEST	MEAN GAIN
Experimental group (cooperative learning)	96	29.35	$\overline{X_2}$ 68.20	$\bar{X}_3$ 38.85
Control group (conventional method)	83	29.03	52.12	23.09

The data presented in Table 1 shows that the students in the experimental group have a pre-test mean score of 29.35 and control group have a pre-test mean of 29.03, a post-test mean score of 68.20. While the students in the control group have a pre-test mean score of 29.03 and a posttest mean 52.12. This means that the groups were found to be almost equal in pre-test. The students in the experimental group taught with cooperative learning method have their mean gain of 38.85 as compare with the students in the control group taught using the conventional method have their mean gain of 23.09. This signified that students taught with cooperative learning perform better to students taught using conventional method.

Research Question 2

What are the Retention scores of students taught electrical work maintenance using cooperative learning and students taught using conventional method.

Table 2: Mean Scores of Students Experimental Group Taught electrical work maintenance using Cooperative learning and Conventional Group.

GROUP	N	POST - TEST	RETENTION	MEAN GAIN
Experimental group (cooperative learning)	$\overline{X}_1$ 96	68.20	$\overline{X}_2$ 67.30	$\bar{X}_3$ 0.90
Control group (conventional method)	83	52.12	41.22	10.90

The data presented in Table 2 shows the students in the experimental group have a post-test mean score of 68.20, a retention mean score of 67.30. While the students in the control group have a post-test mean score of 52.12 and the retention mean score of 41.22. Since the main gain of experimental group is less as compare to control group, it shows that students in the experimental group taught with cooperative learning method retain what was taught better than the students in the control group taught using the conventional method.

Hypothesis 1

There is no statistically significant ($p < .05$) difference in the mean achievement scores of students taught electrical work maintenance using cooperative learning and students taught with conventional method

Table 3: Summary of the Z-test on the effect of cooperative learning and conventional group for teaching electrical work maintenance Subjects

GROUP	MEAN	S.D	N	DF	Z CAL*	Z CRITICAL	REMARK
Experimental Group (Cooperative Learning)	68.20	11.68	96	117	7.44	1.98	S
Control Group (Conventional Method)	52.12	9.01	83				

*S- significant

Table 3. Indicates that the calculated value Z-test is 7.44, this value is higher than the critical z value found to be 1.98 of 117df at the significant level of 0.05. Consequently, the null hypothesis was rejected since the calculated value of Z is greater than the

critical Z-value. This implies that there is a statistically significant (p <.05) difference in the mean achievement scores of students taught electrical work maintenance with cooperative learning and the conventional method.

Hypothesis 2

There is no statistically significant (p <.05) difference in the mean retention scores of students taught electrical work maintenance using cooperative learning and students taught with conventional method.

Table 4: Summary of the Z-test on the effect of cooperative learning and conventional group for teaching electrical work maintenance Subjects

GROUP	MEAN	S.D	N	DF	Z CAL*	Z CRITICAL	REMRK
Experimental Group (Cooperative Learning)	67.30	11.73	96	117	6.88	1.980	S
Control Group (Conventional Method)	41.22	10.13	83				

*S- significant

Table 4 indicates that the calculated value Z-test is 6.88. This value is higher than the critical z value found to be 1.98 of 117df at the significant level of 0.05. Consequently, the null hypothesis was rejected since the calculated value of Z is greater than the critical Z-value. This implies that there is a statistically significant (p <.05) difference in the mean retention scores of students taught electrical work maintenance with cooperative learning and the conventional method.

Summary of Findings

Based on the data collected and the analysis for this study, the following major findings were made with respect to the research questions and hypotheses.

1. Students taught with cooperative learning method scored higher in the post test than those taught with the conventional method. This means that cooperative learning lead to higher performance achievement in electrical work maintenance than lecture method.
2. The students taught with cooperative learning method also score higher in the retention test.

This means that cooperative learning led to higher performance in retention of electrical work maintenance than lecture method.

3. The students taught with cooperative learning approach had higher mean scores than those taught by the conventional method in electrical work maintenance achievement and retention test. This implies that the cooperative learning are more effective in enhancing students performance of learning and retention in electrical work maintenance than the lecture method
4. There is a significant difference in the mean scores of students taught electrical work maintenance using cooperative learning and students taught with conventional method

Discussion of findings

The analysis of the results of the achievement and retention test shown on Table 1 and Table 2 that experimental group had higher mean scores than the control group in post test and retention test. The z-test of the post test and retention test scores presents on Table 3 and 4 confirmed that the difference between the mean scores of students in both groups in the post test and retention was significant. This significant difference is attributed to the treatment. The finding indicated that cooperative learning has a positive effects on students performance in electrical work maintenance, this implies that cooperative learning are more effective than the conventional lecture method in enhancing students performance in electrical work maintenance.

Some of the likely reasons why cooperative learning style is superior to the conventional method include the fact that Cooperative learning style fosters student-student interaction in classrooms. The findings of these researchers supported firmly the above (Johnson, Johnson and Smith, 1999) Thus; it elicits in the student the spirit of helping one another to arrive at their common goal. Interdependence and involvement among students in electrical work maintenance is harnessed through this cooperative learning method- a situation that can be hardly obtained in the normal conventional method.

Cooperative learning method creates accountability awareness among the students and thus encourages collaborative dialogue between students. Students are always excited through this learning process as they get more attention and are closer to their teachers; the learning style also offers all students an opportunity to succeed in their learning. Student retains better what is learnt as students interact freely among themselves when learning or

solving problems in electrical work maintenance subjects (Lee, & Yeap, 1997). It engenders in the teachers to be more committed in their teaching in terms of lesson preparations and provision of teaching aid also equitable use of and provision of instructional materials played an important role in enhancing the superiority of the cooperative learning style against the conventional method, This supported firmly Davison (1990) view's that the teacher's role includes initiating group work, presenting guidelines, forming heterogeneous groups, preparing and introducing new material, interacting with small groups, tying ideas together, making assignments of homework or class work, and evaluating student performance. It is also supported by other researchers like Johnson, Johnson and Smith (1999).

Also, it is well known fact in education that when students work or learn in groups, in order to be an effective participant, will need to think critically in order to make logical contributions moreover, when students learn in groups, the bright ones always help the dull one to understand the subject matter being learnt.

Conclusion

The study investigated the effect of cooperative learning on achievement and retention of electrical work maintenance students. The purpose of the study was to compare the effect of cooperative learning and the conventional teaching method on the mean achievement of students and their retention. Two null hypotheses were formulated. The pre-treatment test, the post-treatment and the retention test were tools used for data collection. The hypotheses were tested using the Z-test technique. There is a significant difference in the mean achievement scores of students taught electrical work maintenance using cooperative learning and those that use the conventional teaching method. This implies that the cooperative learning is more effective than the conventional method of teaching electrical work maintenance. Implications for the study were made after the limitations of the study were enunciated.

Recommendations

On the basis of the findings and its implications of this study the following recommendations were made:

I. Teachers should encourage students to learn and work in groups as this will enable them to improve their academic performance and thereby give room for better performance in both internal and external examination.

II. Teachers should encourage cooperative learning for their

instructional delivery because it will allow them to identify their areas of strengths and weakness and hence regulate their rate of learning without being compelled.

III. Supervisors and principals should discourage the use of conventional methods of learning most especially in teaching electrical installation work maintenance.

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